

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) FIBRILLATION PROCESS

(71) We, COURTAULDS LIMITED, a British Company, of 18 Hanover Square, London, W.1, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the fibrillation of an orientated strip or film of a crystalline polymeric material.

It has been proposed to orientate filaments, strips and films of crystalline polymeric material by stretching them and then to treat the orientated article so as to cause it to fibrillate into fibres. Various fibrillating treatments have been proposed including such mechanical actions as twisting, brushing, for example with a porcupine roller, rubbing, for example between leather pads, and flexing.

According to this invention, a process for fibrillating a strip or film of a crystalline polymeric material which has been longitudinally orientated to render it fibrillatable comprises moving the strip or film longitudinally past a plurality of fluid jets together extending transversely of the moving strip or film and directed at said strip or film.

The fluid jets may be liquid or gaseous but are conveniently jets of air emanating from a line of jet holes aligned transversely across the strip or film. The line of jet holes preferably extends across substantially the whole width of the strip or film and is preferably at right angles to its longitudinal axis. Also, the fluid jets may emanate from more than one transverse line of jet holes.

The strip or film is preferably held under tension as it passes the jet holes so that it tends to press against the jet holes. Each fluid jet is then responsible for the formation of a longitudinal split in the strip or film and so the degree of fibrillation is dependent upon the spacing of the jet holes.

The appropriate pressure under which the fluid is forced through the jet holes is dependent upon the ease with which the orientated strip or film fibrillates and upon

the distance between the tensioned strip or film and the jet holes.

The invention is illustrated by the following Example which is described in relation to the drawing accompanying the provisional specification, in which

Figure 1 is a diagrammatic plan of an orientated strip of polypropylene film being passed over a jet head, and

Figure 2 is a diagrammatic sectional elevation corresponding to Figure 1 and also showing tensioning rollers.

A strip 1 of transparent crystalline polypropylene film was stretched in the longitudinal direction at a stretch ratio of 10 : 1 at a temperature of 150°C to a stretched size of 0.5 inch width and 0.002 inch thickness. The strip 1 was then passed in the direction of the arrow A over the face 2 of a jet head 3 at a linear speed of 100 metres per minute, being pressed against the face 2 by the tensioning rollers 4 and 5.

At the same time air at a pressure of 40 pounds per square inch was passed into the chamber 6 of the jet head 3 through the inlet pipe 7 and emerged from the chamber 6 through two lines of jet holes 8 and 9 in the face 2 as a series of air jets. The lines of jet holes 8 and 9 were parallel to each other and at right angles to the direction of travel of the strip 1 but with the holes staggered so that the transverse location of a hole in one line was mid-way between the transverse locations of two adjacent holes in the other line. The holes were 0.005 inch in diameter and were spaced apart in each line by 0.01 inch.

As the strip 1 was passed over the lines of holes 8 and 9, the air jets burst through the readily fibrillatable strip to cause the formation of a series of longitudinal splits 10 in the strip. The fibrillated strip was then twisted to form a yarn-like article suitable for use as baler twine.

Alternatively the fibrillated strip could be successively chopped transversely to form staple fibres.

## WHAT WE CLAIM IS:—

1. A process for fibrillating a strip or film of a crystalline polymeric material which has

- 5 been longitudinally orientated to render it  
fibrillatable comprising moving the strip or  
film longitudinally past a plurality of fluid  
jets together extending transversely of the  
moving strip or film and directed at said strip  
or film.
- 10 2. A process as claimed in Claim 1 in  
which the fluid jets issue from one or more  
lines of jet holes aligned transversely across  
the strip or film.
- 15 3. A process as claimed in Claim 2 in  
which each line of jet holes extends across  
substantially the whole width of the strip or  
film.
- 20 4. A process as claimed in Claim 2 or  
Claim 3 in which each line of jet holes is  
aligned at right angles to the longitudinal axis  
of the strip or film.
- 25 5. A process as claimed in any of Claims 2  
to 4 in which the strip or film is held under  
tension against the jet holes as it is moved  
past them.
6. A process as claimed in any of Claims 1  
to 5 in which the fluid jets are air jets.
7. A process as claimed in any preceding  
claim in which the strip or film is made of  
polypropylene.
8. A process for fibrillating an orientated  
strip or film substantially as hereinbefore  
described in the Example and with reference  
to the drawing accompanying the provisional  
specification.
9. A process as claimed in any preceding  
claim including the additional step of twisting  
the fibrillated strip or film to form a twine.
10. A process as claimed in any of Claims  
1 to 8 including the additional step of  
successively chopping the fibrillated strip or  
film transversely to form staple fibres.
11. A fibrillated strip or film made by a  
process as claimed in any of Claims 1 to 8.
12. A twine made by the process claimed  
in Claim 9.
13. Staple fibres made by the process  
claimed in Claim 10.
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